

Poor House Run Hydrologic Assessment and Watershed Action Plan

April 1, 2022



Prepared By:

ShoreRivers
114 S. Washington Street
Easton, MD 21601
443-385-0511
info@shorerivers.org
www.shorerivers.org



Funded By:

Chesapeake Bay Trust
Watershed Assistance Program
60 West Street #405
Annapolis, MD 21401
410-974-2941
www.cbtrust.org

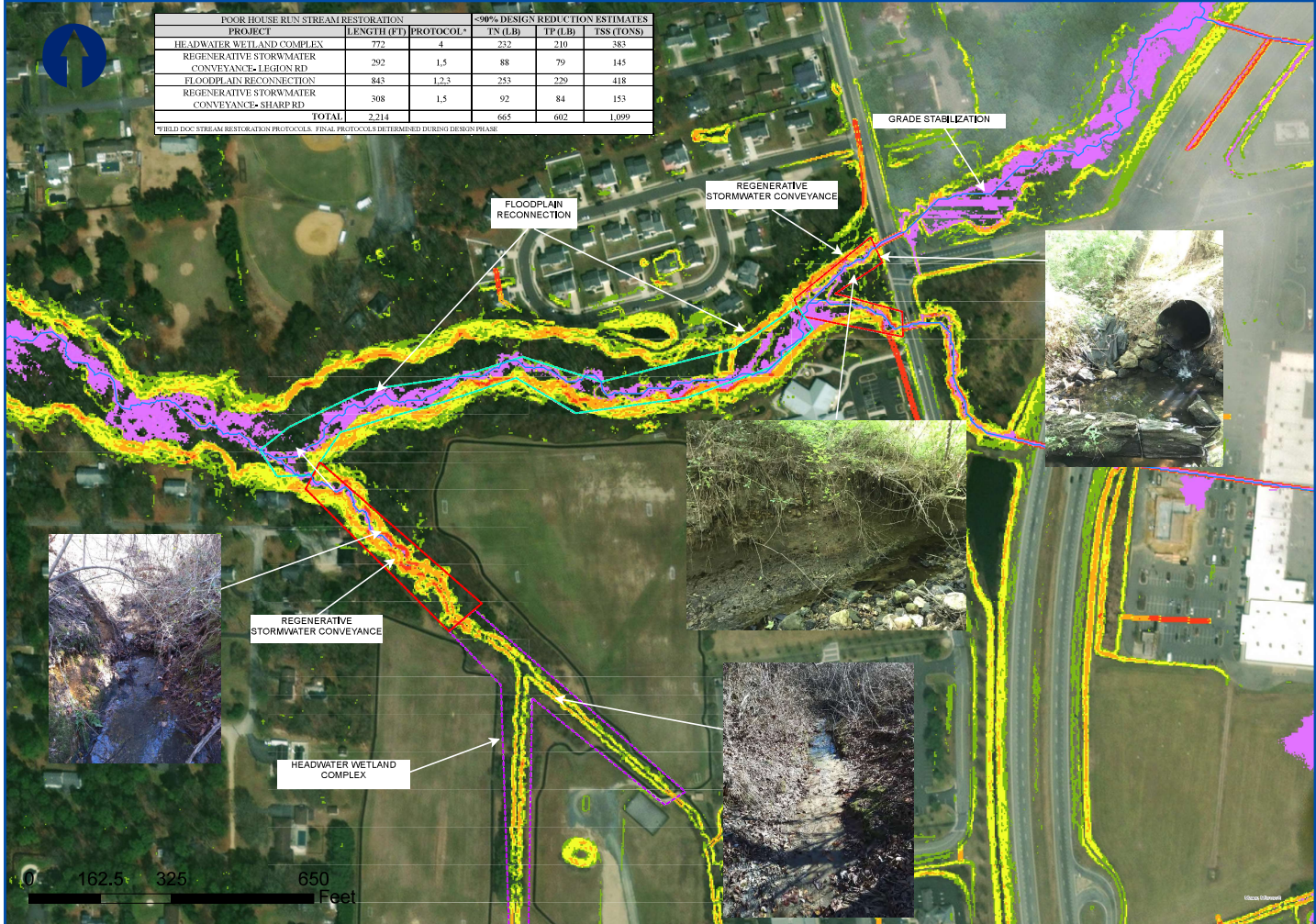


Appendix B: Concept Plans



POOR HOUSE RUN STREAM RESTORATION			<90% DESIGN REDUCTION ESTIMATES		
PROJECT	LENGTH (FT)	PROTOCOL*	TN (LB)	TP (LB)	TSS (TONS)
HEADWATER WETLAND COMPLEX	772	4	232	210	383
REGENERATIVE STORMWATER CONVEYANCE-LEHIGH RD	292	1.5	88	79	145
FLOODPLAIN RECONNECTION	843	1.2.3	253	229	418
REGENERATIVE STORMWATER CONVEYANCE-SHARP RD	308	1.5	92	84	153
TOTAL	2,214		665	602	1,099

*FIELD DOC STREAM RESTORATION PROTOCOLS. FINAL PROTOCOLS DETERMINED DURING DESIGN PHASE



STREAM RESTORATION OPPORTUNITY
POOR HOUSE RUN



114 S. Washington St.
Suite 201
Easton, MD 21601
443.985.0511
info@shorerivers.org

Legend

- Swains
- Height Above Channel Meters
- Elevation
- < 5.5
- Slope Percent
- < 15
- 15 - 25
- 25 - 40
- 40 - 75
- > 75

DATE: 9/20/2022



RIPRAP LAYER INSTALLATION

DESCRIPTION
RIPRAP LAYERS ARE TO BE DESIGNED AND CONSTRUCTED AS ONE CONTINUOUS UNIT WITH THE RIPRAPE AS AN EXTENSION OF THE WEIR TO CONVEY STREAM FLOW FROM POOLS TO THE NEXT WEIR IN A CONTROLLED FASHION.

MATERIALS
RIPRAPE SUBSTRATE AND APPROVAL
1. THE CONSTRUCTION MANAGER SHALL REVIEW RIPRAPE MATERIAL FOR REVIEW AND APPROVAL PRIOR TO BEGINNING CONSTRUCTION.
2. ALL MATERIAL SHALL MEET THE APPROVAL OF THE CONSTRUCTION MANAGER. THE VARIUS SIZES OF THE ROCK SHALL BE EQUALLY DISTRIBUTED WITHIN THE REQUIRED SIZE RANGE. THE SIZE OF AN INDIVIDUAL ROCK PARTICLE SHALL BE DETERMINED BY MEASURING ITS DIAMETER ACROSS THE INTERMEDIATE AXIS.

WEIR ROCKS AND FOOTERS SHOULD BE CLASS II RIPRAP OR SIMILAR SEED SALVAGED STONE.
SOIL STABILIZATION MATTING
1. MATTING SHALL BE WOVEN MACHINE SPUN BRISTLE COIR TWINE MADE OF COIR FIBER OBTAINED FROM FRESH WATER CURED COCONUT HUSKS.

GEOTEXTILE
1. GEOTEXTILE MATERIAL SHALL CONSIST OF CLASS E GEOTEXTILE FABRIC TO BE INSTALLED ONLY UNDER FOOTER AND WEIR BOULDERS, NOT UNDER RIPRAPE SUBSTRATE.

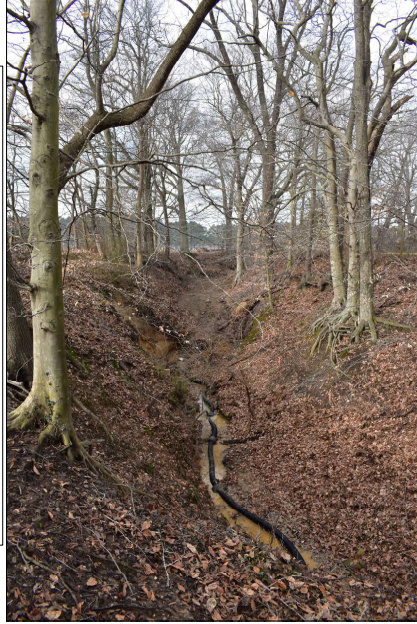
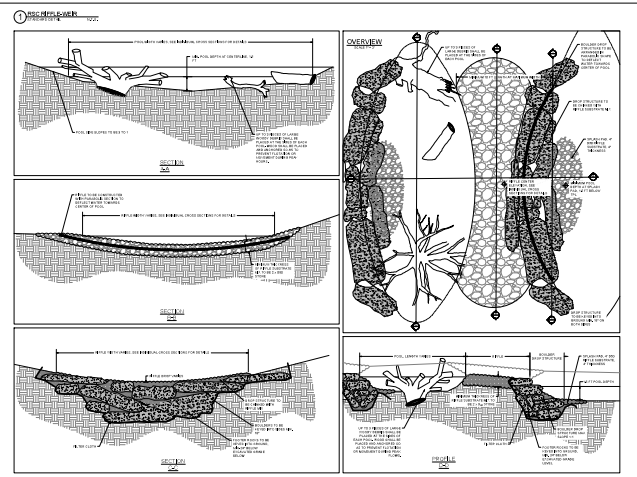
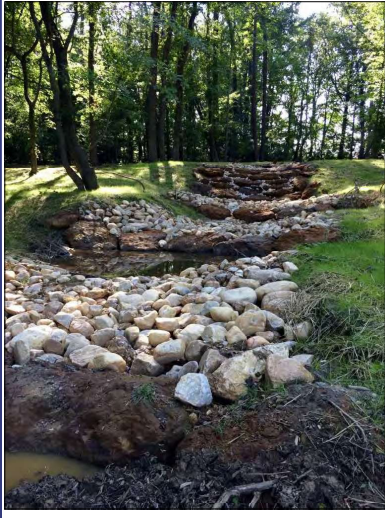
WOODY DEBRIS
1. LARGE CRYSTAL WOODY DEBRIS MATERIAL LIKE TREE STUMPS SHALL BE PLACED AND ANCHORED INTO EACH POOL. IDEALLY, WOODY DEBRIS MATERIAL IS FOUND ON-SITE. IF MATERIAL CANNOT BE FOUND ON-SITE, OFF-SITE DEBRIS MAY BE USED IF INSPECTED FOR QUALITY AND CONSISTENCY BY ENGINEER OR CONSTRUCTION MANAGER.

CONSTRUCTION
1. INSTALL AND EXCAVATE FOOTER BOULDERS TO ANCHOR THE GRADE CONTROL, HOLD PARABOLIC SHAPE AND PREVENT UPPER WEIR BOULDERS FROM ROLLING DOWNSTREAM. PLACE AND FIN GEOTEXTILE UNDER EXCAVATED FOOTPRINT OF FOOTER BOULDERS. MAKE SURE FOOTERS ARE PLACED ENOUGH INTO SOIL OVER GEOTEXTILE AND SLOPED DOWNSTREAM AND POINTED INTO THE GROUND WITH THE BACK OF EXCAVATOR BUCKET.
2. OVERLAP LAYERS OF BOULDERS, DO NOT STACK. STAGGER SEAMS OF BOULDERS BETWEEN EACH CONSECUTIVE LAYER.
3. INSTALL APRON TO CONVEY FLOW FROM THE WEIR DOWN INTO THE POOL BY PLACING SMALL BOULDERS AND RIVER ROCK ALONG THE DOWNSTREAM EDGE ALONG FOOTER BOULDERS. THE FOOTER BOULDER IS THE BEGINNING OF THE APRON AND EXTENDS INTO THE POOL.
4. INSTALL WEIR BOULDERS IN A CRESCENT PARABOLIC SHAPE TO ESTABLISH THE GRADE THAT CONTROLS FLOW MOVING UPSTREAM. SET WEIR BOULDERS BEHIND FOOTER BOULDERS TO FINISHED ELEVATION.
5. CREATE A ONE-FOOT DROP PROTRUSION TO BOTTOM OF THE WEIR BY TIGHTENING BOULDERS TO CREATE A SLOPED PLANE RATHER THAN A STEP. SCATTER LARGE RIVER ROCK AROUND THE WEIR, RIPRAPE, AND BOULDERS TO DEBRISPT AND SLOW FLOW.
6. ADD SAND AND GRAVEL TO FILL VOIDS AND REMAINING TRENCHES AT ALL POSSIBLE.
7. INSTALL AND EXTEND RIPRAPE SUBSTRATE MIX BY PLACING RIVER ROCK UPSTREAM OF WEIR BOULDERS THAT OVERLAP AND BLEND, CONTINUING TO THE EDGE OF THE UPSTREAM POOL, DO NOT INSTALL GEOTEXTILE FABRIC UNDER RIPRAPE.
8. TRACK THE WEIR WITH A SKID STEER TO LOCK MATERIAL INTO PLACE, RANDOMLY CAST MIXED SIZE GRAVEL AND SAND INTO THE RIPRAPE AND AROUND THE EDGES TO FILL VOIDS EXCESS MATERIAL AT THE RIPRAPE AND POOL EDGES FOR TOUCHUPS.
9. CHURN ALL LAYERS OF BOULDERS AND ROCKS BY PLACING SMALLER BOULDERS AND ROCKS IN CRACKS AND OPENINGS.
10. OVER RIPRAPE LAYERS AT THE END OF CONSTRUCTION AFTER STREAM STABILIZATION, OBSERVE FLOWS AND ADJUST CHURNING WITH ADDITIONS OF SAND, GRAVEL, AND RIVER ROCK. REPEAT SEVERAL TIMES AS NECESSARY.

BANK STABILIZATION OF HEADCUT IN SIDE CHANNEL TO MAIN STEM AT CHESAPEAKE COLLEGE, BEFORE AND AFTER RESTORATION - APPROX 8 FT DEEP 5 FT WIDE

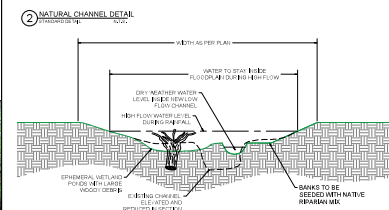
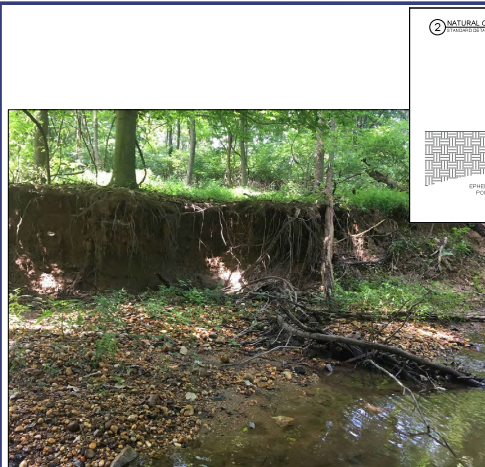


EXAMPLE OF BANK STABILIZATION TO A HEADCUT RAVINE AT KING'S CREEK TALBOT COUNTY MD

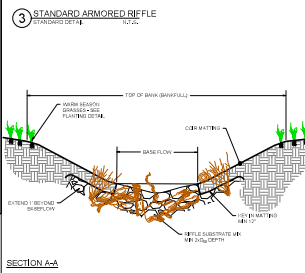


BANK STABILIZATION - HEADCUT SIDE CHANNELS
EXAMPLE PHOTOGRAPHS AND DETAILS
TVA MAP XXXX, GIBP XXXX, PARCEL XXXX
PREPARED FOR XXXXX
SHORIVERIVERS
114 S. Washington St
Suite 304
Easton, MD 21601
410.385.0511
info@shoriverivers.org

PROPOSED REVISIONS
Priority items that have been approved by you, and that you agree to implement on the basis of the information provided.
Revision date: 15 Sept 2023
DATE: _____
REVISIONS: _____
REVISIONS: _____
REVISIONS: _____
REVISIONS: _____
REVISIONS: _____



RECONSTRUCTED FLOODPLAIN AFTER GROWUP PERIOD



RIFLE WITH WOODY MATERIAL INSTALLATION

DESCRIPTION
WORK SHALL CONSIST OF FURNISHING AND INSTALLING STONE AND WOODY MATERIALS FOR THE CREATION OF RIFLE GRADE CONTROL STRUCTURES WITHIN THE PROPOSED STREAM BED. RIFLE GRADE CONTROL STRUCTURES ARE TO BE UTILIZED AT EVERY RIFLE ALONG THE PROPOSED STREAM ALIGNMENT.

MATERIALS

- RIFLE SUBSTRATE MIX MATERIAL SHALL CONSIST OF SALVAGED NATURAL FIELD ROCK OR FURNISHED CRUSHED ROCK FROM A QUARRY AND SHALL BE SOUND, TIGHT, DENSE, RESISTANT TO THE ACTION OF AIR AND WATER, AND DETAIL IN ALL RESPECTS FOR THE PURPOSE INTENDED.
 - THE CONSTRUCTION MANAGER SHALL REVIEW RIFLE MATERIAL FOR REVIEW AND APPROVAL PRIOR TO BEGINNING CONSTRUCTION.
 - SUBSTRATE SHALL BE A MIXTURE CONFORMING TO THE "RIFLE SUBSTRATE SPECIFICATION".
 - ALL MATERIAL SHALL MEET THE APPROVAL OF THE CONSTRUCTION MANAGER. WHILE NO SPECIFIC GRADATION IS REQUIRED, THE VARIOUS SIZES OF THE ROCK SHALL BE EQUALLY DISTRIBUTED WITHIN THE REQUIRED SIZE RANGE. THE SIZE OF AN INDIVIDUAL ROCK PARTICLE SHALL BE DETERMINED BY MEASURING ITS DIAMETER ACROSS THE INTERMEDIATE AXIS.
- WOODY MATERIAL**
- WOODY MATERIAL SHALL BE 4" IN DIAMETER MAXIMUM AND 15-18 INCHES IN LENGTH.
 - WOODY MATERIAL SHALL BE FROM NATIVE TREES AND SHRUBS. NO EXOTIC OR INVASIVE SPECIES ARE TO BE USED.

CONSTRUCTION

- SALVAGEABLE MATERIAL WITHIN ANY GIVEN WORK AREA SHALL BE HARVESTED AND STOCKPILED FOR LATER USE.
- EXCAVATE PROPOSED CHANNEL TO FORM SUBGRADE OF PROPOSED RIFLE SEQUENCE.
- PLACE A PORTION OF WOODY DEBRIS IN THE EXCAVATED RIFLE. WOODY MATERIAL SHALL BE PLACED IN A MANNER IN WHICH IT IS KEPT INTO THE PROPOSED BANKS. PROPOSED RIFLE MATERIAL, AND/OR DRIVEN INTO THE SUBSTRATE PRIOR TO RIFLE MATERIAL PLACEMENT.
- PLACE RANDOM CLASS II RIPRAP HABITAT STONES THROUGHOUT RIFLE.
- ADD BASE LAYER OF COMPACTED CLASS I CLASS 5 COBBLE AND SALVAGED MATERIAL. EXTEND SUBSTRATE 1 FT BEYOND BASE FLOW WIDTH AND APPROXIMATELY 0.4' BELOW FINISHED SURFACE.
- REGRADE STREAM BANKS TO THE PROPOSED SITE AND ELEVATION. MAKING SURE TO KEY IN COIR MATTING A FULL 1 FT ALONG EDGE OF BASEFLOW.
- SPREAD PROPOSED BEED MIX ON NEWLY GRADED BANKS. FOLD BACK COIR MATTING, AND STAKE IN PLACE. COIR SHOULD BE CARRY PAST BANKFULL WIDTH BY 3-4 FT. MINIMAL KEY IN EDGE OF COIR ALONG TOP OF BANK.
- PLACE REMAINING SUBSTRATE MIX WITHIN BASEFLOW AND BRING TO FINAL ELEVATION. MAKING SURE TO COVER AND PROTECT THE EDGE OF NEWLY INSTALLED SOIL.

STREAM IS INCISED AND DISCONNECTED - WATER LEVEL NEVER GETS HIGH ENOUGH TO COVER FLOODPLAIN AND SLOW DOWN



LOG CROSS VANE WITH EXTENDED ARM INSTALLATION

DESCRIPTION
THIS WORK SHALL CONSIST OF INSTALLING A LOG CROSS VANE STRUCTURE WITH AN EXTENDED VANE ARM TO PROVIDE GRADE CONTROL, BANK STABILITY, AND MINIMIZE NEAR BANK STRESS.

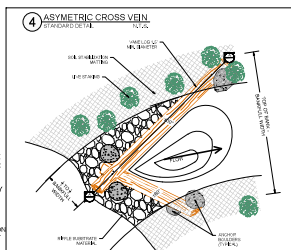
MATERIALS

- LOGS**
LOGS SHALL BE HARDWOOD SPECIES HAVE A MINIMUM LENGTH OF 13 FEET AND A MINIMUM DIAMETER OF 18 INCHES. ALL MATERIAL SHALL BE FREE OF ROT AND EVIDENCE OF PESTS. ALL BRANCHES AND ROOT MASS SHALL BE REMOVED.
- BACKFILL SUBSTRATE MATERIAL**
BACKFILL SUBSTRATE SHALL CONFORM TO RIFLE SUBSTRATE SPECIFICATIONS.
- ANCHOR BOULDERS**
ANCHOR BOULDERS SHALL CONSIST OF CLASS II RIPRAP OR EQUIVALENT SALVAGED BOULDERS FOUND ON SITE.
- SOIL STABILIZATION MATTING**
1. MATTING SHALL BE WOVEN MACHINE SPUN BRISTLE COIR TWINE MADE OF COIR FIBER OBTAINED FROM FRESH WATER SOWN COCONUT HUSKS.
2. SOIL STABILIZATION MATTING (COIR700 OR EQUIVALENT) SHALL CONFORM TO THE "SOIL STABILIZATION MATTING DETAIL".

CONSTRUCTION

- CUT A TRENCH FOR THE LOG VANE FROM THE STARTING POINT IN THE STREAM, EXTENDING UP TO 0.5' - 1' BELOW BANKFULL ELEVATION AT A TWENTY TO THIRTY (20-30) DEGREE ANGLE UPSTREAM FROM THE PROPOSED BANK. THE DIMENSIONS OF THE TRENCH (WIDTH AND DEPTH) SHALL ACCOMMODATE THE FOOTER ROCKS AND VANE LOGS.
- EXCAVATION OF THE TRENCH AND PLACEMENT OF LOGS SHALL BE CONDUCTED FROM THE MOST STREAMWARD POINT AND WORK TOWARD THE STREAMBANK. AN OPTIONAL FOOTER LOG MAY BE NECESSARY AND SHOULD BE INSTALLED AT THE DESIGNATION OF THE DESIGNATED SPECIALIST IN THE FIELD. THE POSITIONING OF THE VANE LOG SHALL BE ANGLED TOWARD THE STREAMBANK, WITH THE TOP OF THE VANE LOG BEING PLACED JUST BELOW THE PROPOSED BANKFULL ELEVATION SO THAT THE END OF THE LOGS IS BURIED IN THE BANK.
- THE SHORTENED LOG WILL BE PLACED AT THE CHANNEL INVERT SUCH THAT THE LOG INVERT ELEVATION MATCHING THE SUBSTRATE ELEVATION INDICATED ON THE PROFILE. THE SHORTENED LOG WILL BE CUT 0.5' - 1.0' FEET BELOW BANKFULL ELEVATION INTO THE POINT BAR.

RECONSTRUCTED STREAM BED IS ELEVATED AND REDUCED TO FORCE WATER ONTO THE FLOODPLAIN AND SLOW IT DOWN



FLOODPLAIN RECONNECTION
EXAMPLE PHOTOGRAPHS AND DETAILS

TOL MAP XXXX, CRIP XXXX, PARCEL XXXX
TOL MAP XXXX, CRIP XXXX, PARCEL XXXX
PROPOSED COIR XXXXX

114 S. Washington St.
Suite 301
Easton, MD 21601
410.385.0511
info@shorerivers.org

208 January 2022

Prepared by: [Name]
Reviewed by: [Name]
Approved by: [Name]
Date of Approval: [Date]
Revision made: 15 Sept 2023

NO.	DATE	REVISIONS



A EXISTING OVERGROWN AND FILLED DETENTION BASIN.



B EXISTING OUTLET PIPE (NO OUTLET STRUCTURE)



C EXAMPLE OUTLET STRUCTURE

**DETENTION POND RETROFIT
POOR HOUSE RUN
ANALYSIS**

PROJECT NO: 2022-03-22
DATE: 03/22/2022
DRAWN BY: JAV
CHECKED BY: JAV
SCALE: AS SHOWN

SHORERIVERS

114 S. Washington St.
Suite 301
Easton, MD 21601
410.385.0511
info@shorerivers.org

22 March 2022

Prepared For: Commissioners of Denton
Project Location: Poor House Run
Project No: 2022-03-22
Revision: 1.0
Date: 03/22/2022

NO.	DATE	REVISIONS

CONCEPT SKETCH